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Measurement of the positron annihilation induced auger electron spectrum from Ag(100)

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Abstract

Research has demonstrated that Positron Annihilation Induced Auger Spectroscopy (PAES) can be used to probe the top-most atomic layer of surfaces and to obtain Auger spectra that are completely free of beam-impact induced secondary background. The high degree of surface selectivity in PAES is a result of the fact that positrons implanted at low energies are trapped with high efficiency at an image-correlation potential well at the surface resulting in almost all of the positrons annihilating with atoms in the top-most layer. Secondary electrons associated with the impact of the incident positrons can be eliminated by a suitable choice of an incident beam energy. In this paper we present the results of measurements of the energy spectrum of electrons emitted as a result of positron annihilation induced Auger electron emission from a clean Ag(100) surface using a series of incident beam energies ranging from 20 eV down to 2 eV. A peak in the spectrum was observed at ~40 eV corresponding to the N2,3VV Auger transition in agreement with previous PAES studies. This peak was accompanied by an even larger low energy tail which persisted even at the lowest beam energies. Our results for Ag(100) are consistent with previous studies of Cu and Au and indicate that a significant fraction of electrons leaving the sample are emitted in the low energy tail and suggest a strong mechanism for energy sharing in the Auger process.

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